PREPARED FOR:

TWIN CREEKS SPECIAL SERVICE DISTRICT

PREPARED BY:

BOWEN COLLINS & ASSOCIATES

TWIN CREEKS SPECIAL SERVICE DISTRICT

SEWER SYSTEM MASTER PLAN

JANUARY 2025

2024 TWIN CREEKS SPECIAL SERVICE DISTRICT SEWER SYSTEM MASTER PLAN

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1
EXECUTIVE SUMMARY

INTRODUCTION

The purpose of this Sewer Master Plan is to provide an implementation plan for recommended improvements to resolve existing and projected deficiencies in the Twin Creeks Special Service District's (TCSSD / The District) sewer collection system.

PROJECTED FLOWS

To model the District's sewer collection system, it is necessary to project how sewer flows will increase and/or decrease in the future. A sanitary sewer loading hydrograph consists of two major components: base sanitary flow and infiltration. These two types of flows were calculated using data from the district and applied to growth projections to predict existing and future sewer loading on the TCSSD sewer system.

SEWER COLLECTION SYSTEM EVALUATION

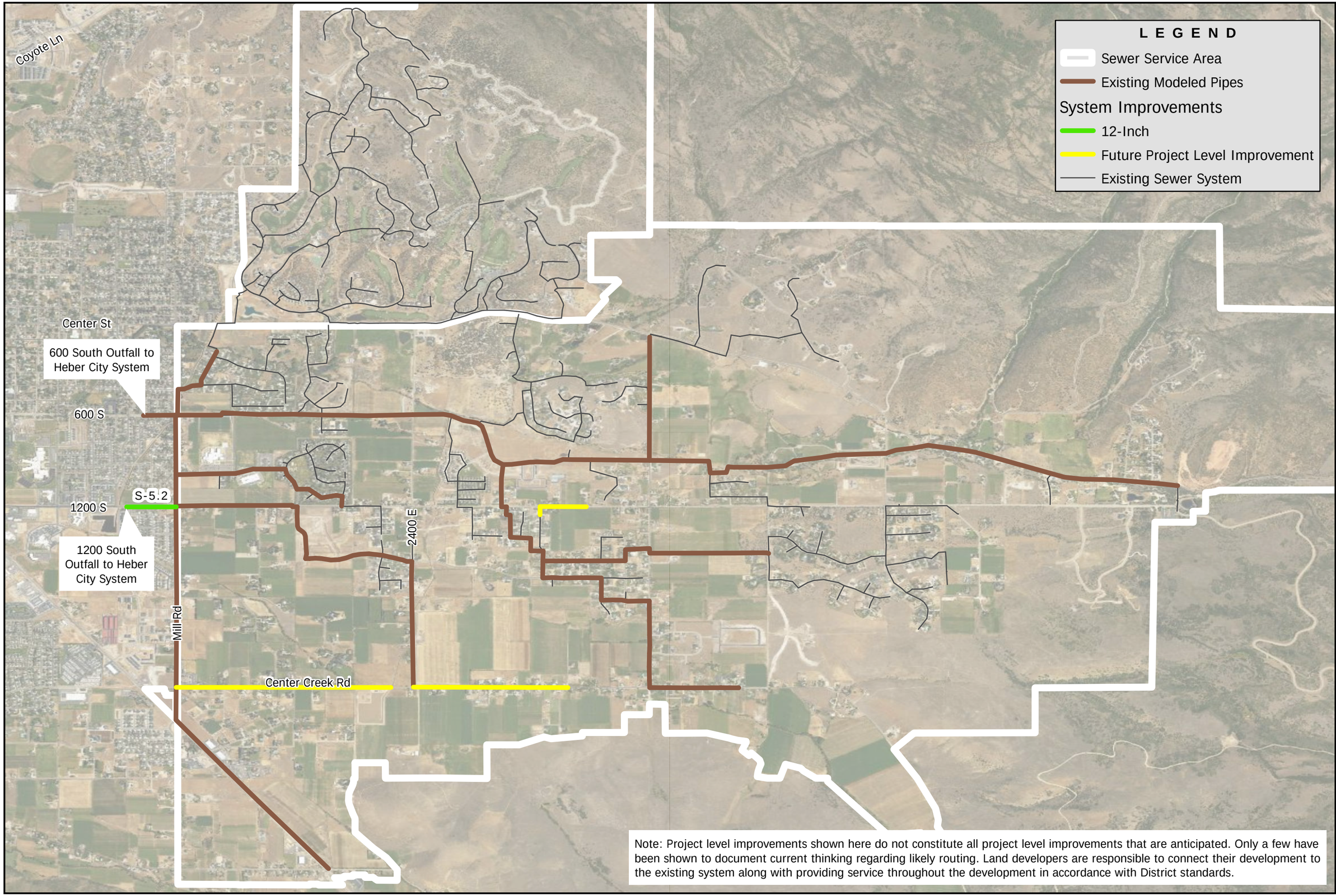
With the development of projected wastewater flows, it is possible to evaluate hydraulic performance of the existing sewer system as well as to identify potential deficiencies using a calibrated sewer model. An existing, 10-year, and buildout condition model was prepared for the District. BC&A analyzed each model to identify proposed projects for the system.

SYSTEM IMPROVEMENTS

Based on the growth projections, flow projections, and sewer model prepared during this analysis, a list of recommended projects was produced and is shown in Table ES-1 and Figure ES-1.

Table ES-1
Recommended TCSSD System Improvements

Project ID	Estimated Construction Year	Project Description	Approximate Size	Approximate Length	Estimated Total Project Cost in 2024 Dollars
S-5.2	2033+	1200 South Outfall Connection	12-inch	1,300	$626,490
Total	**-**	**-**	**-**	**-**	**$626,490**



SCALE: 1 in = 2,500 ft

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RECOMMENDED TCSSD SYSTEM IMPROVEMENTS

TWIN CREEKS SPECIAL SERVICE DISTRICT

2024 TCSSD SEWER MASTER PLAN

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FIGURE NO.

ES-1

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CHAPTER 2
INTRODUCTION AND BACKGROUND

INTRODUCTION

In 2023, Twin Creeks Special Service District (TCSSD / the District) contracted the services of Bowen, Collins & Associates, Inc. (BC&A) to complete an update to its Sewer System Master Plan which was originally completed by BC&A in 2015. The purpose of this study is to provide TCSSD with an updated plan to maintain a viable and efficient sewer system capable of meeting the expected future demands of its service areas and able to satisfy customer expectations.

TCSSD is situated in Wasatch County and serves an area just east of Heber City. It was established in 1993 by Wasatch County in response to a request by a group of developers to provide culinary water and sewer services to unincorporated parts of Wasatch County. Currently, it still services unincorporated parts of Wasatch County.

SCOPE OF SERVICES

Since the last master plan was completed, the growth within TCSSD has increased and many improvements have been made to the TCSSD Sewer system. BC&A was retained to complete a Sewer Master Plan which includes the following sub tasks:

Task 1: Collect and review information from previous master plans and analyses. This includes analyzing the existing and future customer base by updating growth projections and estimating sewer demand in addition to collecting and reviewing information on the existing sewer system.

Task 2: Update and calibrate a hydraulic computer model of TCSSD's existing and future sewer distribution system and use it to analyze existing and future operating deficiencies

Task 3: Create a project implementation schedule by using the model to identify alternative system improvements while considering project costs.

Task 4: Develop a water system capital facilities plan using the completed analysis and stakeholder input.

Task 5: Hold up to three progress meetings with the District throughout the analysis.

Task 6: Prepare information provided in the prepared capital facilities plan to be used in a future sewer impact fee facilities plan and sewer impact fee analysis.

ACKNOWLEDGEMENTS

The BC&A team wishes to thank the following individuals from TCSSD for their cooperation and assistance in working with us in preparing this plan:

Max Covey	General Manager
Dave Fuller	Assistant General Manager
Chance Morris	Distribution / Collections Manager

PROJECT STAFF

The project work was performed by the BC&A team members listed below. Team member's roles on the project are also listed. The project was completed in BC&A's Draper, Utah office. Questions may be addressed to Justin Dietrich, Project manager at (801) 495-2224.

Keith Larson	Principal-In-Charge
Justin Dietrich	Project Manager
Emily Fica	Staff Engineer

REPORT ASSUMPTIONS

As a long-term planning document, this report is based on a number of assumptions relative to future growth patterns, service area expansion (or lack thereof), and source availability. Of special significance to the District are a number of assumptions relative to conservation and development densities. If any variables are significantly different than what has been assumed, the results of this report will need to be adjusted accordingly. Because of these uncertainties, this report and the associated recommendations should be updated every four to six years or sooner if significant changes occur such as annexation or changes in development patterns.

CHAPTER 3
DEMAND PROJECTIONS

INTRODUCTION

To plan for the future, it is necessary to project coming increases in sewer demand. The TCSSD service area has experienced a high rate of growth in the last decade. This high rate of growth is expected to continue because there is still considerable space for more development and because current applications and plans for new development are extensive. The expected growth consists of filling in the active service area with new development, as well as development and growth outside of the currently active service area. The purpose of this chapter is to summarize the work that was performed to estimate the sewer service needed to meet both existing and future customer demands. Sewer service necessary to satisfy capacity requirements during peak periods of use have been estimated.

DEMAND PROJECTION METHODOLOGY

There are several methods that can be used to estimate future sewer needs. This study develops demand projections based on the general plan that has been adopted by Wasatch County. The methodology used in this study is as follows:

1. Define the service area.
2. Project the growth of the number of sewer connections for the study area through build-out based on currently available land development plans and on the County's General Plan when development plans are absent.
3. Convert projections of connection growth to a system sewer demand based on historic per connection demand.

Each step of this process is summarized in the sections that follow.

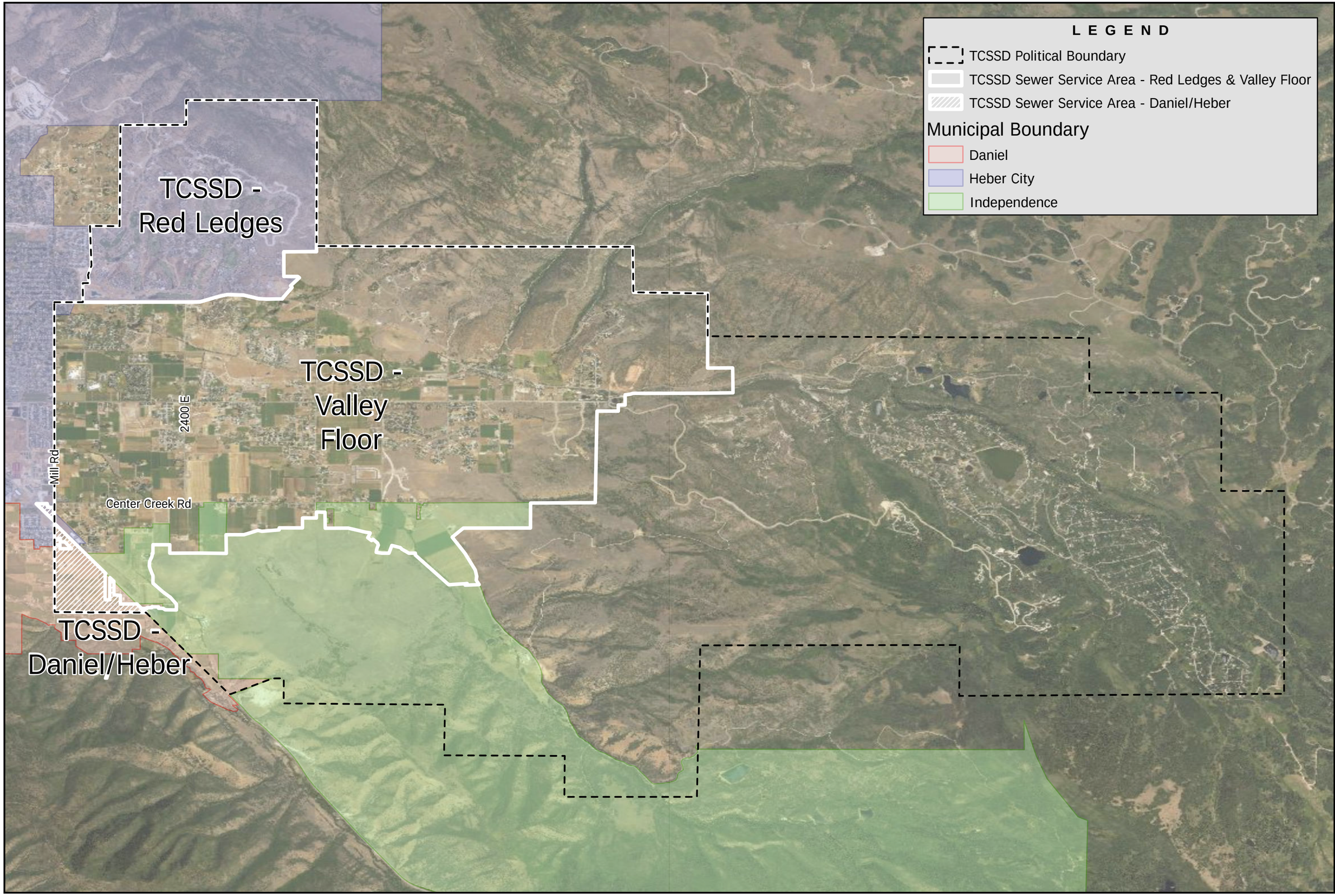
SERVICE AREAS

The TCSSD political boundary, as well as the sewer system boundary, are shown in Figure 3-1. The political boundary contains areas which TCSSD is currently serving, areas that are planned to be served in the future, and areas which have no current plans for service by TCSSD. The sewer system boundary contains only those areas which are currently being served or are planned to be served by TCSSD. The sewer system serves a large portion of the unincorporated land within Wasatch County east of Heber City.

The areas within the TCSSD boundary which are currently served, or planned for service in this Master Plan, consist of the following two service areas: the Twin Creeks area and the Red Ledges area. Some of the key characteristics of each area are described briefly as follows:

- *Twin Creeks – Valley Floor.* The Twin Creeks sewer system serves a large portion of the unincorporated land within Wasatch County east of Heber City, as well as a small portion of Independence Township. The TCSSD system collects flow from these areas and conveys it to the system outfall, where it eventually reaches the Heber Valley Special Service District (HVSSD) Treatment Plant.
- *Twin Creeks - Red Ledges.* Within the TCSSD political boundary is a development area known as Red Ledges. Red Ledges currently sends sewer flows to the TCSSD outfall, but will be transferring their sewer to the Jordanelle Special Service District (JSSD) Water Reclamation Facility (JSSD WRF) within the next couple of years. Therefore, flows from Red Ledges will not be involved in buildout planning for the TCSSD area collection system or outfalls to HVSSD. The ultimate planning for the Red Ledges area is related to conveyance to the JSSD WRF.
- *Twin Creeks – Daniel/Heber.* Within the sewer service area are small portions of Daniels Townships and Heber City that are currently planned to be served by TCSSD. These small areas have been accounted for in this plan but may end up being served by their own governing entities. The final sewer service entity will be coordinated at the time of development and may depend on timing, availability of infrastructure, developer preference, etc.
- *Christensen Development (not included in this plan).* The Christensen Development is a new proposed development located northeast of the mountains that border TCSSD to the north. Little Pole Road runs north and eventually turns into a dirt road in the canyon that this proposed development is within. The development is proposing to have 5,000 SCUs in the area with the possibility of conveying flows to TCSSD's system. If even a portion of the Christensen Development's sewer flows are conveyed to TCSSD, it would significantly affect the capacity of the pipelines and the outfall/treatment agreements.

The remaining areas within the TCSSD boundary not included in the above TCSSD service areas (See Figure 3-1) are not currently planned for service and have been excluded from consideration in this master plan for various reasons. The Timber Lakes Development and the LDS Church camp have their own sewer system. Areas that are higher elevation mountain areas or designated as federal, state or preservation lands are also excluded because development on these lands is restricted and/or unfeasible.



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NORTH: NORTH

TCSSD SYSTEM BOUNDARIES

TWIN CREEKS SPECIAL SERVICE DISTRICT
2024 TCSSD SEWER MASTER PLAN

BOWEN COLLINS & ASSOCIATES

FIGURE NO.
3-1

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EXISTING DEVELOPMENT

In June of 2023, the TCSSD active sewer service area had 1,282 sewer connections, which shall be referred to as Sewer Capacity Units (SCUs) throughout this report. Table 3-1 shows the breakdown of these connections per area. These counts were taken from 2023 billing data provided by the District. Therefore, the basis of existing system conditions in this master plan is June 2023.

Table 3-1
Existing connections

Service Area	SCUs
Twin Creeks	893
Red Ledges	389
Total	**1282**

GROWTH PROJECTIONS

The principal goal of this study is to incorporate future needs in the analysis of the system. Therefore, in addition to analyzing existing development, future development has been projected and analyzed in this study.

Buildout

Projected connections for the TCSSD sewer system were prepared for a build-out scenario based on zoning as defined in the 2010 Wasatch County General Plan[1] (WCGP) and other data provided by the District, land developers, and others. District personnel gave input on areas that either were not addressed in the WCGP or that have been updated since the publication. Preference was also given to the most recent information analyzed; often this was land development plans provided by property owner/land developers. The zoning within the study area supports only residential development (no commercial or industrial zoning). While some commercial development will likely occur in the future, the primary type of development will be residential. Some of the zoning within the study area is preservation, state, or federal land, which cannot be developed. Other zoning is defined as mountain regions, where lighter development is assumed.

In determining buildout connections for the TCSSD service area, it was generally assumed that the build-out densities (connections/acre) of the valley floor, lower elevation mountain benches, and higher elevation mountain areas would be 1.0, 0.25, and 0, respectively. These densities were modified in several areas where observed existing development densities differ from the standard assumptions. The buildout of the Red Ledges and Independence areas were based on the master plans of those communities. The buildout of the Center Creek area was based on the assumption that lot sizes would be the minimum 1-acre required by the development in that area.

[1] The 2010 version is the latest version of the County plan currently in publication. We are not aware of any more recent County land use planning.

Table 3-2 shows a summary of the different service areas with the total number of projected build-out connections in each. The total number of sewer connections at build-out is projected to be 7,079.

The 2015 Master Plan indicated that during full build-out, TCSSD could serve as many as 9,128 connections, which is obviously more than we now show in this 2023 master plan update. The reason for the difference is that since the publication of the last master plan, the buildout area has been refined, some recent developments have developed at lower densities than originally anticipated, and a few additional areas expected to be infeasible for development have been removed from the plan.

Table 3-2
Build-Out Connections

Service Area	SCUs
Twin Creeks	5954
Red Ledges	1125
Total	**7079**

System Growth

The projected growth in the number of connections in the TCSSD service area was based on observed historic growth rates, specifics of the several service areas, and buildout generally being reached around the year 2080. Growth in system connections is illustrated in Figure 3-2 and Table 3-3.

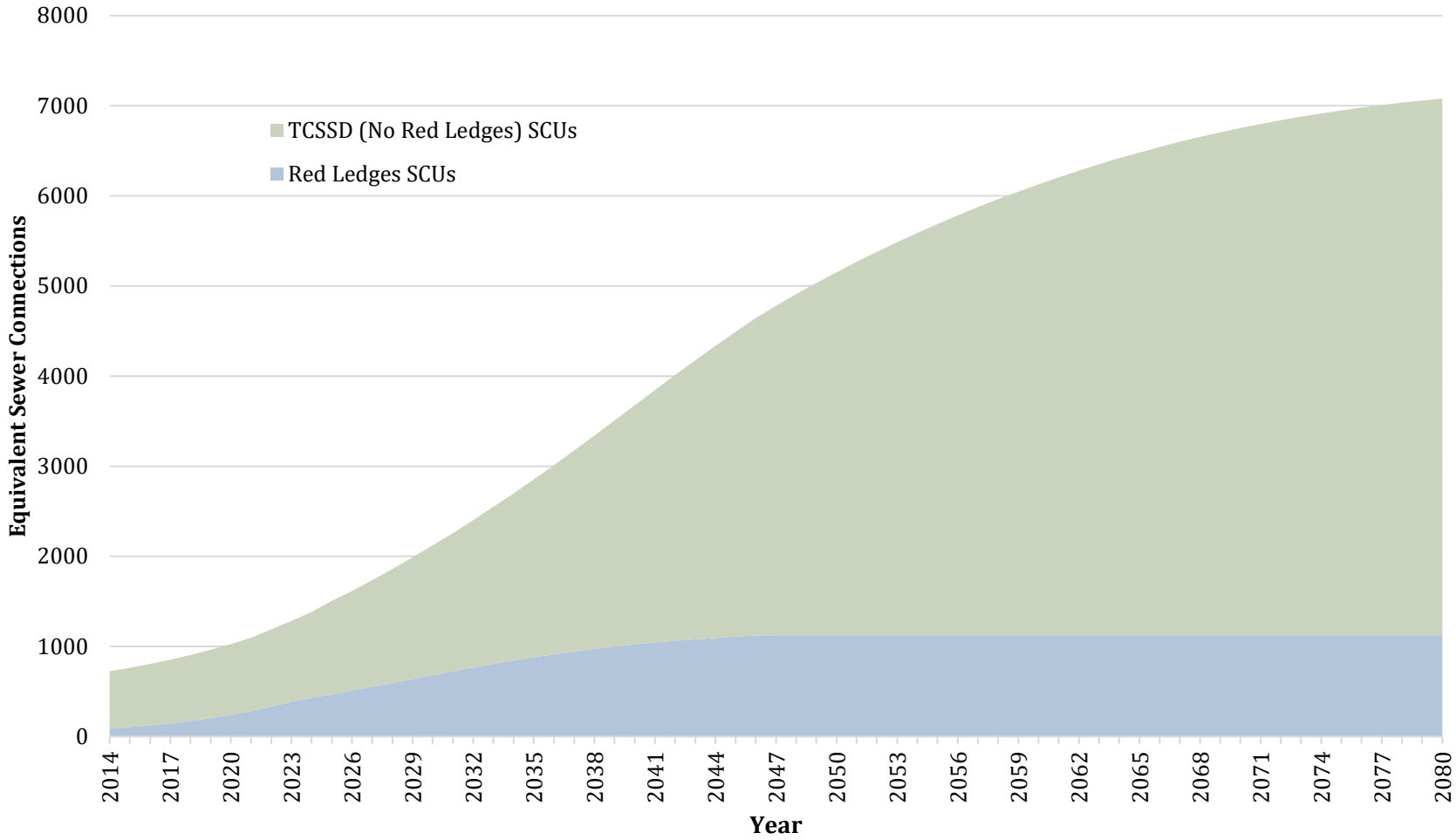


Figure 3-2. Projected Sewer Service Area Growth

Table 3-3
Projected Sewer Service Area Growth

Year	TCSSD Projected SCUs	Red Ledges Projected SCUs	Total Projected SCUs	Annual Average Projected Growth Rate
2023	893	389	1282	N/A
2024	956	428	1384	7.9%
2025	1036	468	1504	8.7%
2026	1105	510	1615	7.4%
2027	1182	553	1735	7.4%
2028	1263	597	1860	7.2%
2029	1348	640	1988	6.9%
2030	1439	683	2122	6.7%
2031	1535	725	2260	6.5%
2032	1636	767	2403	6.3%
2033	1743	806	2549	6.1%
2040	2654	1022	3676	5.5%
2050	4027	1125	5152	4.0%
2060	5003	1125	6128	1.9%
2070	5627	1125	6752	1.0%
Buildout	5954	1125	7079	0.5%

SEWER DEMAND PROJECTIONS

The future demand of TCSSD customers has been estimated to project future required sewer service. Three different sources of typical flows seen in a sewer collection system were considered as part of this study and are described below (Base Sanitary Flow, Infiltration, and Inflow). These flows were then applied to system growth to produce projected demands from 2023 through 2080.

Base Sanitary Flow

Base sanitary flow consists of the wastewater generated by residential, commercial, and industrial customers. This flow can be directly tied to indoor water demands, and a study was recently completed using metered indoor flows to calculate the average indoor water demand per connection in the TCSSD system. Therefore, this study opts to assume that the base sanitary flow per SCU is 95% of the calculated indoor water demand per unit of 188 gpd, for a total of 178 gpd per SCU as shown in Table 3-4.

Typically, the total base sanitary flow per SCU is determined by analyzing metered flow data. However, TCSSD does not meter their sewer system, so flow data was collected in quarterly reports provided by Heber City at the outfall to the TCSSD system. BC&A analyzed this flow data but determined that it was inconsistent and not accurate enough to be utilized in analyzing TCSSD's sewer system. Instead, BC&A opted to utilize the previously calculated indoor water demand per unit as described in the above paragraph.

Base sanitary flow varies throughout the day. As discussed above, there is no available daily data to assist in developing a flow pattern specific to TCSSD. Therefore, a typical flow pattern based on studies for other similar municipalities with hourly multipliers was chosen with a peak multiplying factor of 2.5 as shown in Table 3-4.

Infiltration

Over time, sewer collection pipes can deteriorate and allow for the entrance of groundwater. Pipe joints, cracked pipes, improper connections, and cracked manholes are particularly susceptible to such occurrences. Depending on the age and condition of the system, infiltration may contribute significant flow to the system. Based on this system, an appropriate allowance for infiltration is 45 gpd per SCU as shown in Table 3-4.

Although infiltration varies with time when examined over a period of several months or years, very little variation in time will occur during a single day. Therefore, when infiltration is added to the hydraulic model as a component of the total estimated sewer flow, it is added simply as a constant flow with no daily peaking factor.

Inflow

During rainfall events, water may enter the sewer collection through gaps in surface manholes, damaged pipes, damaged manholes, or illegal drain connections into the system. Because the quantity of this inflow is highly unpredictable, it is not included when calculating sewer production projections. Instead, additional capacity is reserved in sewer lines as a hefty safety factor to properly convey inflow.

Table 3-4
Estimated Daily Sewer Flows

Observed average indoor water demand per dwelling (gpd/dwelling):	188
Average Day to Peak Month Average Day Peaking Factor:	1
Average Base Sanitary Flow per Sewer Capacity Unit (gpd/SCU):	178
Estimated Daily Infiltration per Sewer Capacity Unit (gpd/SCU):	45
Total Estimated Daily Sewer Flow per Sewer Capacity Unit (gpd/SCU):	223
Peak Hour Peaking Factor:	2.5
Estimated Peak Hour Sewer Flow per Sewer Capacity Unit (gpd/SCU):	490

Total Sewer Projections

The projected SCUs shown in Table 3-3 can be multiplied by the flow rates calculated above to identify flow rate projections from now through buildout. Table 3-5 identifies the summary of projected sewer demands.

Note that Red Ledges plans to divert sewer flows from the TCSSD sewer system to the JSSD WRF by the end of 2026. After that point, Red Ledges will no longer utilize TCSSD's sewer system, even though they are still within TCSSD's service area. Sewer connections in this section reflect Red Ledges accordingly by removing flow associated with them in and after 2026.

Table 3-5
Summary of Projected Sewer Demands

Year	SCUs Served by TCSSD*	TCSSD Estimated Average Daily Sewer Production (MGD)	TCSSD Estimated Peak Hour Sewer Production (MGD)
2023	1282	0.29	0.63
2024	1383	0.31	0.68
2025	1505	0.34	0.74
2026	1105	0.25	0.54
2027	1182	0.26	0.58
2028	1263	0.28	0.62
2029	1348	0.30	0.66
2030	1439	0.32	0.71
2031	1535	0.34	0.75
2032	1636	0.36	0.80
2033	1743	0.39	0.85
2040	2654	0.59	1.30
2050	4027	0.90	1.97
2060	5003	1.12	2.45
2070	5627	1.26	2.76
Buildout	5954	1.33	2.92

*Red Ledges plans to divert sewer flows from the TCSSD sewer system to the JSSD sewer system by 2026; hence the drop in total production.

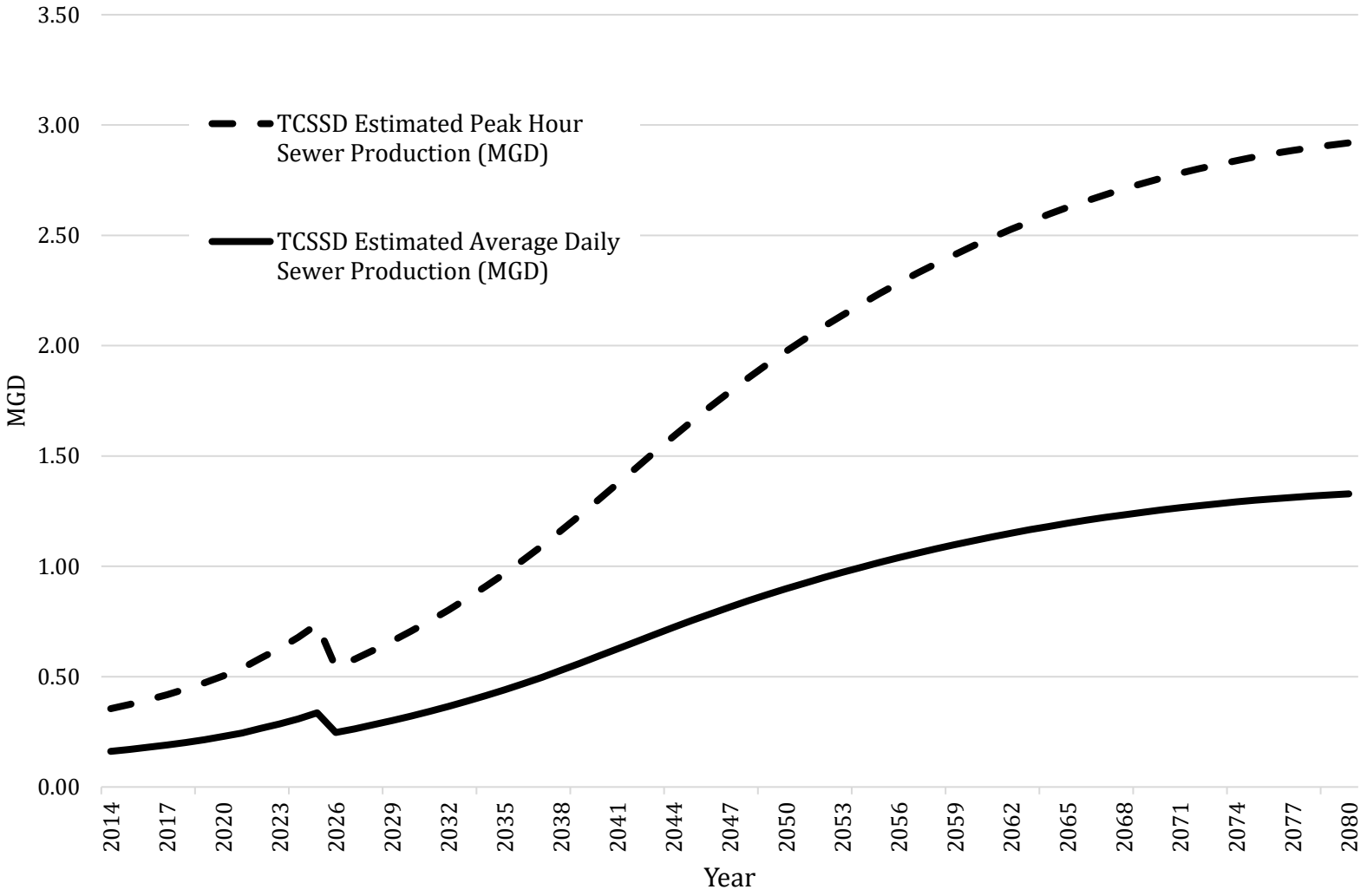


Figure 3-3. Summary of Projected Demands

CONSERVATION

The State of Utah has water conservation goals on a per-capita basis. Because conservation is generally achieved through the reduction of outdoor water use, no reduction in sewer flows due to conservation was assumed for the planning window of this study. Additionally, the calculated flow rate per unit used in the modeling for this study is already low in comparison to other Utah entities. With those items in mind, it is recommended that the District continue to track water use and adjust its projections in future studies to account for any changes in water use.

CHAPTER 4
EXISTING SYSTEM

INTRODUCTION

As part of this capital facilities plan, BC&A has assembled an inventory of existing infrastructure within the sewer collection system. The purpose of this chapter is to present a summary of TCSSD's existing sewer system and is intended to be used as a quick reference for TCSSD personnel.

SEWER COLLECTION PIPES

The TCSSD sewer system is composed of collection lines ranging from 8-inches to 15-inches in diameter, as shown in Figure 4-1. Table 4-1 provides a summary of the length and size of all TCSSD sewer pipes. Pipe material is mostly PVC with a few sections being HDPE and a few sections being ductile iron as shown in Figure 4-2.

Table 4-1
TCSSD Sewer Collection Pipe Inventory

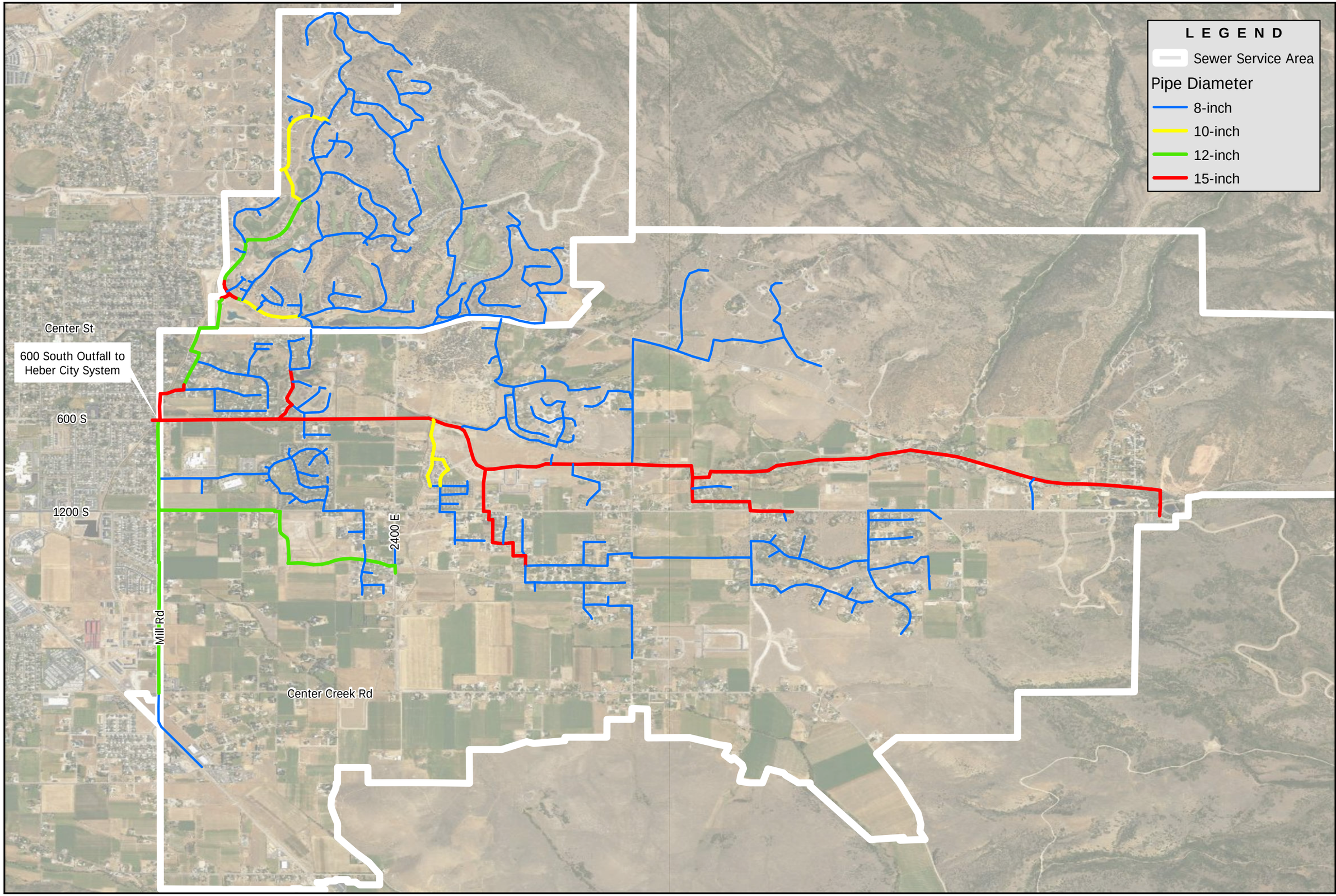
Diameter	Total Length in Red Ledges (ft)	Percentage of Red Ledges Network	Total Length in TCSSD (ft)	Percentage of TCSSD Network	Total Length (ft)	Percentage of Total Network
8-inch	73,474	88%	109,900	67%	183,374	74%
10-inch	4,914	6%	3,105	2%	8,019	3%
12-inch	4,642	6%	16,974	10%	21,616	9%
15-inch	868	1%	35,252	21%	36,120	14%
Total	**83,898**	**100%**	**165,231**	**100%**	**249,129**	**100%**

LIFT STATIONS

The TCSSD sewer collection system does not currently use any lift stations; the system operates completely under gravity flow.

WASTEWATER TREATMENT

TCSSD currently sends all wastewater flow to the treatment plant operated by Heber Valley Special Service District (HVSSD). Sewer flows from TCSSD are routed to the Heber City sewer collection system at 600 South where they are then conveyed through Heber City to the HVSSD treatment plant. TCSSD has an active agreement with Heber City to utilize capacity in their collection system for this purpose until the year 2026 with options to extend through 2102.



SCALE: 1 in = 2,500 ft

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TCSSD EXISTING SEWER SYSTEM PIPE SIZE

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2024 TCSSD SEWER MASTER PLAN

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FIGURE NO.

4-1

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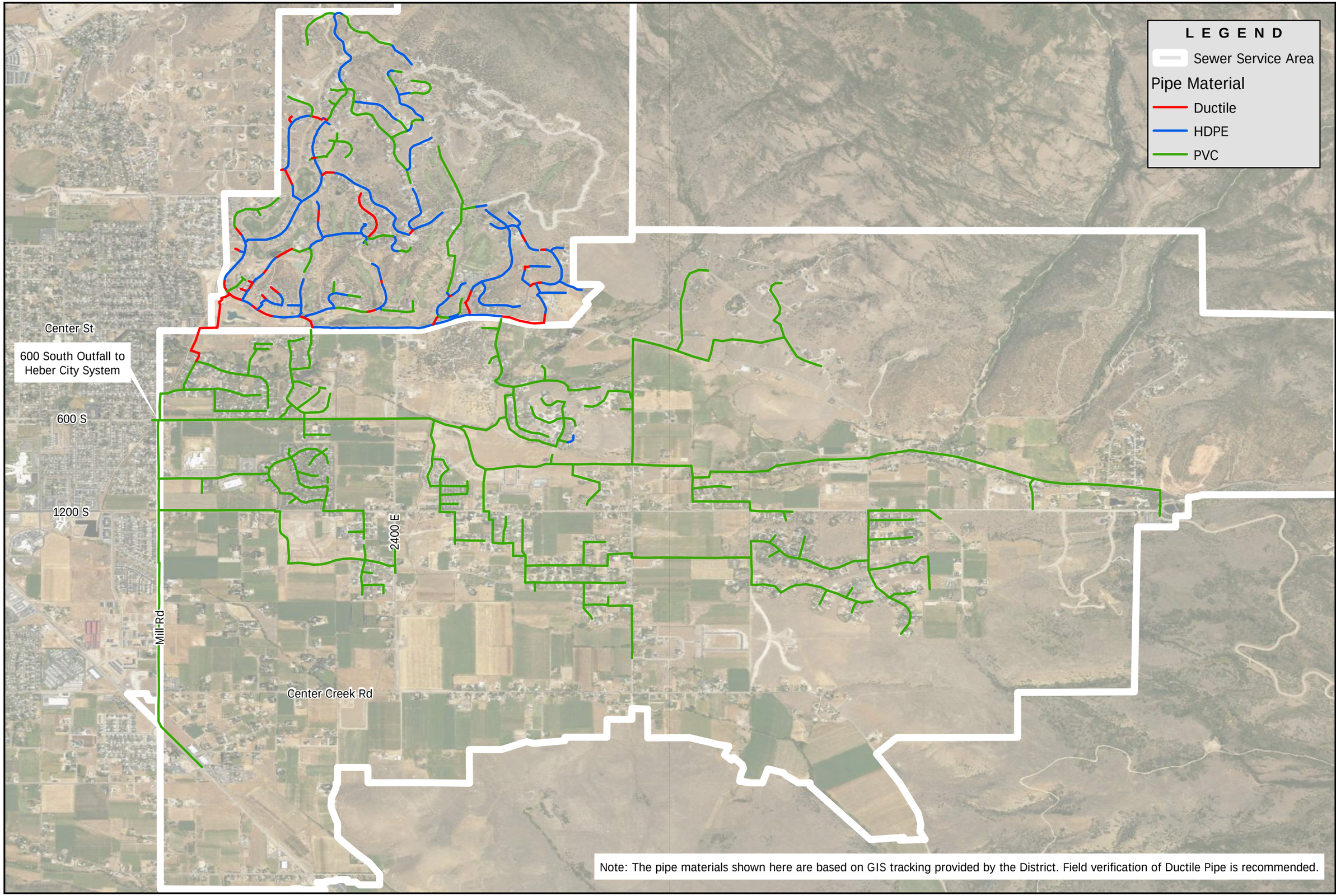

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TCSSD EXISTING SEWER SYSTEM MATERIAL

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2024 TCSSD SEWER MASTER PLAN

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FIGURE NO.

4-2

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CHAPTER 5
HYDRAULIC MODELING

INTRODUCTION

The purpose of this chapter is to provide TCSSD with the evaluation criteria used to create and analyze a hydraulic model of their sewer system. A hydraulic model is a mathematical representation of the system which considers the pipes, manholes, and wastewater flows found in the sewer collection system. Hydraulic computer models are useful because they allow the user to simulate operations of large, complex sewer systems and consider how future changes in flow will affect those systems.

GEOMETRIC MODEL DEVELOPMENT

There are two major types of data required to create a hydraulic model of a sewer system: geometric data and flow data. Geometric data consists of all information in the model needed to represent the physical characteristics of the system For TCSSD, this includes locations and sizes of pipes and manholes as well as physical characteristics such as pipe roughness. This information is generally collected from system inventory data, direct field measurement, or design drawings. The following sections describe how geometric data was assembled for use in the hydraulic model.

Pipelines and Manholes

It is not economically feasible to model all the sewer pipes and manholes in the TCSSD sewer system. As smaller pipes are added to the model, the more refined the analysis becomes, However, this requires more additional time, effort, and expense to create, calibrate, and maintain the model. That level of refinement is not necessary since it is clear that properly installed, 8-inch neighborhood collection pipes will show to have sufficient capacity. Hence, it is important to consider the required accuracy and available budget when selecting the sewer lines to model.

For this study, modeling major trunk lines was considered adequate for assessing potential hydraulic deficiencies in the system. The sewer CFP which was completed in 2014 had a lack of data pertaining to some manhole locations and invert elevations. Therefore, pipe slopes in the model were estimated using surface topography and assumed manhole depth. Since that time, some additional data has been gathered and many of those pipes have been updated to reflected the actual existing pipe slopes. As-built data or survey data for pipes installed after 2014 was gathered and is reflected in the model.

Pipe Flow Coefficients

Pipes in the hydraulic model were assigned a Manning's roughness coefficient of 0.013. This is approximately equal to the flow coefficient of concrete and clay pipe. While other materials exist within the system with lower published flow coefficients, 0.013 was used throughout the system as a conservative approach for estimating pipe capacity. In reality, collection pipes can develop thin layers of bacteria and solids that result in a relatively uniform flow coefficient close to 0.013 regardless of what material the pipe is actually made of.

FLOW MODEL DEVELOPMENT

Once all required geometric data was collected and a physical model of the system was developed, flow data was added in order to run a hydraulic simulation. Three types of flow information were required for hydraulic modeling: total magnitude of flow, timing of flow, and distribution of flow across the TCSSD service area. The following sections review those flow characteristics.

Total Flow

Flow projections for the TCSSD service area were presented in Chapter 3. Total flow for modeling scenarios is summarized in Table 5-1. Note that Red Ledges plans to divert sewer flows from the TCSSD sewer system to the JSSD sewer system by 2026; hence they are not included in the flow projections past 2026.

Table 5-1
TCSSD Hydraulic Modeling Flow Volumes

Scenario	Base Sanitary Flow (MGD)	Infiltration (MGD)	Total Daily Flow (MGD)
Existing TCSSD	0.16	0.04	0.20
Existing Red Ledges	0.07	0.02	0.09
Existing Total	**0.23**	**0.06**	**0.29**
2033 TCSSD	0.31	0.08	0.39
2033 Red Ledges	0.00	0.00	0.00
2033 Total	**0.31**	**0.08**	**0.39**
Buildout TCSSD	1.06	0.27	1.33
Buildout Red Ledges	0.00	0.00	0.00
Buildout Total	**1.06**	**0.27**	**1.33**

As discussed in Chapter 3, inflow was not incorporated into the model. Instead, the evaluation criteria were formulated to provide adequate excess pipe capacity to accommodate inflow.

Timing of Flow

The values shown in Table 5-1 represent the total flows in the collection system over a 24-hour period. Since sanitary sewer flows vary throughout the day with varying indoor water demands, it is important to model the anticipated peak flow within a day. Because there is no available flow data to develop a diurnal flow pattern specific to TCSSD, a typical flow pattern based on studies for similar municipalities with hourly multipliers was chosen and is shown in Table 5-2. Base sanitary flows were multiplied by the factor shown in the diurnal pattern each hour.

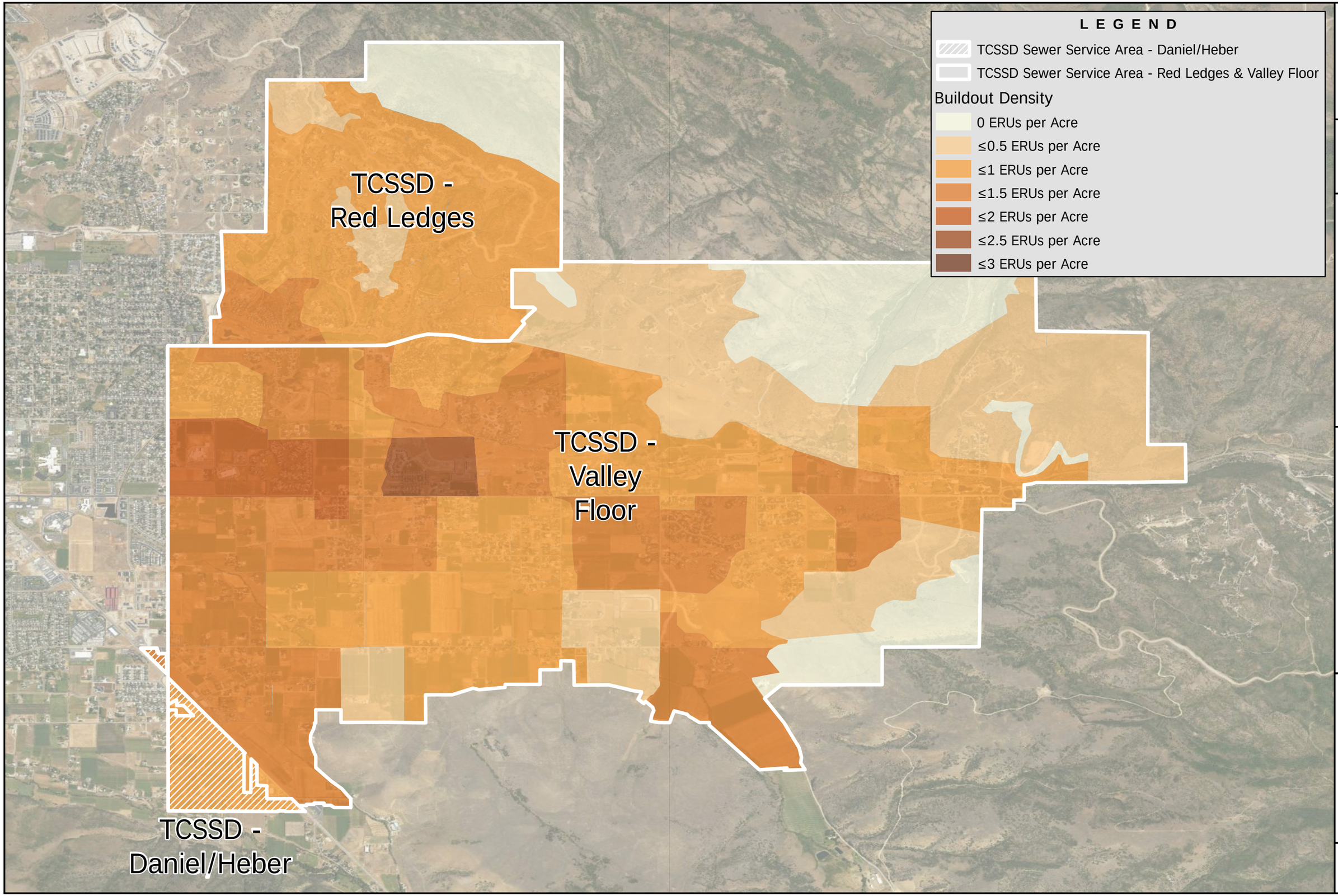
Table 5-2
TCSSD Hydraulic Modeling Diurnal Pattern

Hour	Multiplying Factor
12:00 AM	0.80
1:00 AM	0.60
2:00 AM	0.40
3:00 AM	0.30
4:00 AM	0.20
5:00 AM	0.25
6:00 AM	0.30
7:00 AM	0.45
8:00 AM	0.64
9:00 AM	1.10
10:00 AM	1.70
11:00 AM	2.50
12:00 PM	2.00
1:00 PM	1.60
2:00 PM	1.40
3:00 PM	1.25
4:00 PM	1.10
5:00 PM	1.05
6:00 PM	1.15
7:00 PM	1.33
8:00 PM	1.09
9:00 PM	0.97
10:00 PM	0.90
11:00 PM	0.92
12:00 AM	0.80

Distribution of Flow

Sewer loading was geospatially distributed into sewer sub basins for existing, 10-year, and buildout conditions based on recent aerial imagery (existing condition), known active development (10-yr condition), and land use / zoning planning (buildout condition). The resulting buildout SCU density is shown geographically in Figure 5-1.

Next, flow distribution was estimated by breaking the entire TCSSD service area into separate sewer sub basins as shown in Figure 5-2. Once basins within the district were delineated, surface topography was used to assign flow from that particular basin to a particular junction in the model. In most instances, flows from a basin were input at the upstream-most point of a pipe to maintain a conservative evaluation.



SCALE: 1 in = 3,000 ft

NORTH: NORTH

TCSSD PLANNED BUILDOUT DENSITIES

TWIN CREEKS SPECIAL SERVICE DISTRICT

2024 TCSSD SEWER MASTER PLAN

BOWEN COLLINS & ASSOCIATES

FIGURE NO.

5-1

P:\Twin Creeks SSD\256-17-01.27 TCSSD Sewer Master Plan\4.0 GIS\4.4 APRX\TCSSD-NVSSD Sewer Master Plan\TCSSD-NVSSD Sewer Master Plan.aprx efica 1/15/2025

Coyote Ln

Red Ledges:
Outfall to JSSD
System
Beginning 2026

Center St

600 South
Outfall to Heber
City System

600 S

1200 S

Future 1200
South Outfall to
Heber City System

2400 E

Mill Rd

Center Creek Rd

LEGEND

- Subbasin Flow Direction
- Existing Model Sewer Conduits
- Buildout Model Sewer Conduits
- Existing Sewer Conduits Not Modeled
- Sewer Sub Basins

After the master plan was completed, a development concept to add 100 SCUs to this sub basin was presented. The model was run to confirm the conclusions presented in this master plan are still accurate. However, those SCUs are not finalized, and are therefore not shown in any projections in this plan.

SCALE: 1 in = 2,500 ft

NORTH: NORTH

TCSSD SEWER SUB BASINS

TWIN CREEKS SPECIAL SERVICE DISTRICT

2024 TCSSD SEWER MASTER PLAN

BOWEN COLLINS & ASSOCIATES

FIGURE NO.

5-2

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CHAPTER 6
COLLECTION SYSTEM EVALUATION

INTRODUCTION

The purpose of this chapter is to present the hydraulic modeling results for the TCSSD sewer collection systems under estimated existing, 10-year, and buildout conditions. Based on these results, any deficiencies in the existing or future sewer system were determined.

EVALUATION CRITERIA

In defining what constitutes a hydraulic deficiency, it is important to consider the assumptions made in estimating sewer flows in the model. As described in the above chapters, the sewer flow in the model is composed of two parts: base sanitary flow and infiltration. Because flow estimates are based on a limited data set, actual flows in the system will fluctuate and may be greater than the model estimates. For example, inflow to the system during rain events is not accounted for in the modeled flows and the allowance for groundwater infiltration is, at best, a conservative estimate. Furthermore, peaking assumptions for base sanitary flow are conservative statistical estimates which might be exceeded in reality (albeit in rare, unexpected circumstances). Therefore, the criteria established for identifying deficiencies should be sufficiently conservative to account for occasional flows higher than those estimated in the model.

The most important deficiency to eliminate in TCSSD's sewer system is inadequate pipe capacity. For this master plan, a pipe capacity deficiency has been defined as any point where the modeled peak flow in the pipe is greater than 75 percent of the pipe's full flow capacity (which occurs at a depth of approximately 65 percent of the maximum depth). The remaining 25 percent of pipe capacity is reserved for inflow and/or unaccounted for fluctuations in base sanitary flow and infiltration.

MODEL RESULTS AND ANALYSIS

The following section describes and discusses the results of the existing, 10-year, and buildout model results.

Existing System Model Results

Figure 6-1 displays the results of the 24-hour hydraulic model simulation for the existing TCSSD sewer collection system. The figure displays the percentage used of the full flow capacity. According to the level of service stated above which limits peak flows to a ratio of 75 percent compared to full pipe flow, there are no existing pipe capacity deficiencies.

10-Year Model Results

Figure 6-2 displays the results of the 24-hour hydraulic model simulation for the 10-Year TCSSD sewer collection system. The figure displays the percentage used of the full flow capacity. According to the level of service stated above which limits peak flows to a ratio of 75 percent compared to the full pipe flow, there are no pipe capacity deficiencies within a 10-year window. However, projects related to the expansion of the active service area will occur regardless.

Buildout Model Results

Figure 6-3 displays the results of the 24-hour hydraulic model simulation for the Buildout TCSSD sewer collection system. The figure displays the percentage used of the full flow capacity. According to the level of service stated above which limits peak flows to a ratio of 75 percent compared to the full pipe flow, there are no pipe capacity deficiencies at Buildout. However, projects related to the expansion of the active service area will occur regardless.

Coyote Ln

Red Ledges Outfall to TCSSD System

Center St

600 South Outfall to Heber City System

600 S

1200 S

Mill Rd

2400 E

Center Creek Rd

L E G E N D

Sewer Service Area

Existing Sewer System

Peak Flow / Pipe Capacity

- <0.05
- 0.05 - 0.15
- 0.15 - 0.25
- 0.25 - 0.5
- 0.5 - 0.75
- >0.75

SCALE: 1 in = 2,500 ft

NORTH: NORTH

EXISTING SYSTEM MODEL RESULTS

TWIN CREEKS SPECIAL SERVICE DISTRICT

2024 TCSSD SEWER MASTER PLAN

BOWEN COLLINS & ASSOCIATES

FIGURE NO.

6-1

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Coyote Ln

Red Ledges Outfall to JSSD System

Center St

600 South Outfall to Heber City System

600 S

1200 S

2400 E

Mill Rd

Center Creek Rd

L E G E N D

Sewer Service Area

Existing Sewer System

Peak Flow / Pipe Capacity

- <0.05
- 0.05 - 0.15
- 0.15 - 0.25
- 0.25 - 0.5
- 0.5 - 0.75
- >0.75

SCALE: 1 in = 2,500 ft

NORTH: NORTH

10-YEAR SYSTEM MODEL RESULTS

TWIN CREEKS SPECIAL SERVICE DISTRICT

2024 TCSSD SEWER MASTER PLAN

BOWEN COLLINS & ASSOCIATES

FIGURE NO.

6-2

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Coyote Ln

Red Ledges Outfall to JSSD System

Center St

600 South Outfall to Heber City System

600 S

1200 S

1200 South Outfall to Heber City System

Mill Rd

2400 E

Center Creek Rd

L E G E N D

Sewer Service Area

Existing Sewer System

Peak Flow / Pipe Capacity

- <0.05
- 0.05 - 0.15
- 0.15 - 0.25
- 0.25 - 0.5
- 0.5 - 0.75
- >0.75

SCALE: 1 in = 2,500 ft

NORTH: NORTH

BUILDOUT SYSTEM MODEL RESULTS

TWIN CREEKS SPECIAL SERVICE DISTRICT

2024 TCSSD SEWER MASTER PLAN

BOWEN COLLINS & ASSOCIATES

FIGURE NO.

6-3

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RECOMMENDED SEWER IMPROVEMENTS

The following section identifies system evaluation conclusions and proposed capital improvement projects for TCSSD.

Red Ledges

As discussed in the chapters above, Red Ledges is planned to build pump stations and discharge their flows to the NVSSD sewer system in 2026, hence leaving the TCSSD system. Therefore, flows from Red Ledges are included in the existing conditions model but are not included in either the 10-year model or the buildout model. After 2026, but within the 10-year window, it is projected that the existing TCSSD system will not have capacity for the entirety of Red Ledges. Therefore, if Red Ledges continues to send sewer flows through TCSSD after 2026 rather than pumping to the NVSSD system, they will need to work out a plan with the District to increase capacity in pipes along Pimlico Dr, E 4th St, and Mill Road between the Red Ledges discharge point and 600 South.

600 South Outfall

Part of TCSSD's sewer system includes a discharge into the Heber City system at 600 South. The service agreement with Heber City to utilize this outfall began in 1997. As part of this agreement, TCSSD was required to upsize the pipe which was being constructed along 600 South between 1200 East and 600 West, which resulted in that pipe being increased from a 15-inch pipe to an 18-inch pipe. All the pipes, including the upsized pipes, from the discharge point at 600 South to the Heber Valley Special Service (HVSSD) treatment plant are owned by Heber City.

The agreement discussed above has been updated a number of times, and the current agreement allows a maximum discharge of 2,180 gpm to Heber City's system at 600 South. Additionally, the results of the hydraulic model show that the outfall at 600 South has the capacity to adequately convey wastewater flows for the entirety of TCSSD through buildout. If TCSSD were to end their agreement with Heber City, the alternative would be to construct a new dedicated sewer line all the way to either the HVSSD treatment plant or to the JSSD treatment plant. Since a new line is likely to be more costly, it is recommended that TCSSD continue to renew their agreement to discharge to Heber City at 600 South as needed.

1200 South Outfall

In addition to the agreement with Heber City to discharge to their system at 600 South, TCSSD has entered negotiations resulting in additional capacity being reserved for TCSSD at a separate discharge point at 1200 South. The agreement reserves 2,000 gpm of capacity for TCSSD to discharge to the Heber City system at 1200 South. This second outfall allows the TCSSD system to have a more flexible path forward to provide sewer to a large range of areas without risking overloading pipes along Mill Road or risking exceeding the allowable 2,180 gpm at the 600 South outfall. While there may be enough capacity in the 600 South outfall for TCSSD through buildout as discussed above, in a system not expected to build out until 2080, the security and flexibility that this second discharge point provides is desirable to future planning. The true buildout capacity requirement will be best known the closer to buildout we are. Therefore, we recommend not completing project S5.2 within the 10-year window. We also recommend reevaluating the need for the 1200 South Outfall in a few years after additional development has occurred and better sewer flow data is available.

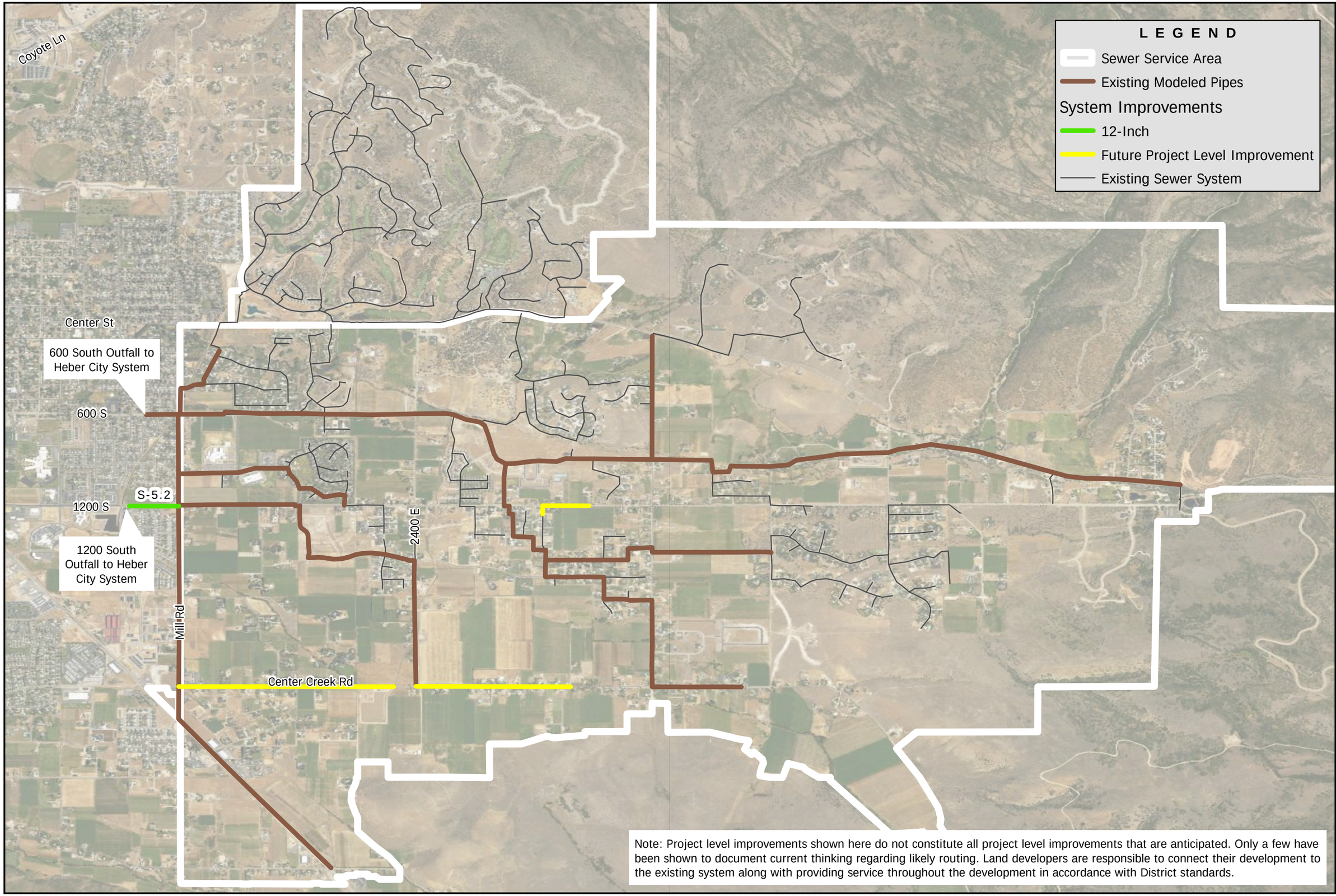
Ductile Iron Pipe

As shown in Figure 4-2 of this report, there are a few small segments of ductile iron pipe (DIP), specifically near the Red Ledges area. Sanitary sewer is a highly corrosive pipe, which DIP is especially subject to. Some of the DIP is in a sewer line which is planned to be abandoned in the next couple of years. However, for all other sections of DIP, the District should monitor those sections of pipe more frequently and initiate a rehabilitation schedule for those pipes as soon as they start to see deterioration. Additionally, there is uncertainty in Figure 4-2 regarding the accuracy of pipe material. It is recommended that the District confirm all pipe material in Red Ledges as part of creating a rehabilitation schedule.

Recommended Capital Improvement Projects

Based on the results of the collection system evaluation, we recommend the following system level improvement projects. Figure 6-4 provides a visual reference for these projects.

- ***S-5.2 – 1200 South Sewer Outfall Project.*** Based on the plan to utilize capacity in the Heber City collection system at 1200 south as discussed above, project S-5 requires approximately 1,300 feet of 12-inch sewer line that will tie the TCSSD system at Mill Road into the Heber City system at 800 East (on the east side of the existing canal). Note that the size of this line is to be determined at the time of design and may need to be larger depending on required flows.



SCALE: 1 in = 2,500 ft

NORTH: NORTH

RECOMMENDED TCSSD SYSTEM IMPROVEMENTS

TWIN CREEKS SPECIAL SERVICE DISTRICT

2024 TCSSD SEWER MASTER PLAN

BOWEN COLLINS & ASSOCIATES

FIGURE NO. 6-4

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CHAPTER 7
CAPITAL IMPROVEMENTS FACILITIES PLAN

INTRODUCTION

Recommended capital improvements pertaining to the TCSSD sewer collection system are identified in Chapter 6. The purpose of this chapter is to summarize each project, present a cost estimate for each project, and develop an implementation plan for the recommended improvements.

CAPITAL IMPROVEMENT PLAN SUMMARY AND BUDGET

The recommended capital improvements for the TCSSD sewer collection system are summarized in Table 7-1. Included in this table is a summary of each project, along with an itemized estimate of project costs. A 15 percent engineering cost has been included for each project. The location of each project is shown on Figure 6-4. Anticipated project timing is indicated, but it should also be understood that some of these projects will be driven by land development so the timing could be accordingly sooner or later.

Table 7-1
Recommended TCSSD System Improvements

Project ID	Estimated Construction Year	Project Description	Approximate Size	Approximate Length	Unit	Unit Cost	Engineering Cost (15%)	Estimated Total Project Cost in 2024 Dollars
S-5.2	2034+	1200 South Outfall Connection	12-inch	1,300	LF	$419	$81,716	$626,490
Total	**-**	**-**	**-**	**-**	**-**	**-**	**$81,716**	**$626,490**

Note: Projects S-3 and S-4, which were previously shown as system level projects, have been determined to be project level improvements and thus are not included in this capital facilities plan.

DRAPER, UTAH OFFICE
154 E 14075 S
DRAPER, UTAH 84020
PHONE: 801.495.2224

BOISE, IDAHO OFFICE
776 E RIVERSIDE DRIVE
SUITE 250
EAGLE, IDAHO 83616
PHONE: 208.939.9561

ST. GEORGE, UTAH OFFICE
20 NORTH MAIN
SUITE 107
ST.GEORGE, UTAH 84770
PHONE: 435.656.3299

OGDEN, UTAH OFFICE
2036 LINCOLN AVENUE
SUITE 104
OGDEN, UTAH 84401
PHONE: 801.495.2224

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